

ANNUAL PROGRESS REPORT - 2007

Hard Mast Survey Great Smoky Mountains National Park

Introduction

Hard mast is the most important fall food for wildlife in Great Smoky Mountains National Park (GRSM). Annual variations in hard mast production affect food habits, movements, habitat preference, reproduction, and, therefore, density of black bears (*Ursus americanus*) in GRSM (McLean 1991). Hard mast also is an important fall food for other wildlife species including white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), chipmunks (*Tamias striatus*), squirrels (*Sciurus carolinensis*, *Tamiasciurus hudsonicus*), wild hogs (*Sus scrofa*), and elk (*Cervus elephas*).

Since 1979, hard mast surveys have been used to collect baseline information for assessing and monitoring mast production in GRSM (Nicholas and White 1984). The following report summarizes the results for the 2007 hard mast survey. The following personnel assisted with the 2007 hard mast survey: Dan Nolfi, Jake Payne, Kyle Sams, Bill Stiver, Rick Varner, and Joe Yarkovich

Methods

Visual surveys (Whitehead 1969) were used to determine the availability and distribution of hard mast. Thirty-four 6.4-km (4.0-mi.) survey routes established in previous years were resampled in 2007. Trees marked with aluminum tags were located using 7.5 minute U.S. Geological Survey topographic maps and a Garmin GPS III Personal Navigator. For each tree sampled, data regarding location, diameter at breast height and species were recorded. Using binoculars, the crown of each tree was surveyed for approximately 30 seconds and an estimate of the percent of visible crown with mast was determined. Using Microsoft Access, mast survey indices were calculated using methods developed by Greenberg and Warburton (2007). Index values ≤ 2.00 were classified as poor, 2.01 to 3.00, fair, and ≥ 3.00 , good (Wentworth 1989). Although a variety of hard mast trees occur in the GRSM (Table 1), oak trees (*Quercus spp.*) were preferred since they are considered the most important mast producing trees (Nicholas and White 1984).

Results

The 2007 hard mast survey was conducted from 9 August to 29 August. A total of 531 trees, representing 10 mast producing species were surveyed (Table 1). The mast index value for all oaks was 1.91 suggesting poor abundance. White oak and red oak indices were 2.00 and 1.67, respectively (Table 2) suggesting poor abundance for each.

Discussion

Although mast indices rated poor, some white oaks, particularly chestnut oaks, produced well in higher elevations (3,000 feet) and were likely more abundant than indicated by the survey.

Further, there were also a few low elevation areas (e.g., Cherokee Orchard road and Little Brier Gap trail, etc.) that also produced abundant white oak mast and numerous bears were concentrated in these areas during fall. In fact, during October, 14 different bears were seen feeding in the Cherokee Orchard road area. Little Brier Gap trail was temporarily closed in November because of numerous bears feeding on white oak mast along the trail.

The spotty white mast in lower elevations was likely the result of the late spring freeze. The freeze likely killed flowering white oak trees in most areas; however those in the higher elevation did not appear to be impacted. Overall, it appears the availability of acorns, particularly white oak mast was better than indicated by the survey. Further, the 2.00 rating for the white oak group was the 3rd highest rating since 1989 (Table 2).

Modifications

A few untagged trees were surveyed to replace trees that were missing tags, damaged or had fallen.

Suggestions for Future Surveys

Only three non-oak trees (all hickories) were surveyed in 2007; these trees should be omitted from future surveys and replaced with oak trees.

Some aluminum tags established on trees in previous years need to be replaced.

Literature Cited

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Table 1. Major hard mast trees of Great Smoky Mountains National Park (Nicholas and White 1984).

<u>Common Name</u>		<u>Scientific Name</u>
	WHITE OAKS	
White Oak (83) ¹		<u>Quercus alba</u>
Chestnut Oak (123)		<u>Quercus prinus</u>
Post Oak (1)		<u>Quercus stellata</u>
Chinkapin Oak (0)		<u>Quercus muehlenbergii</u>
Overcup Oak (0)		<u>Quercus lyrata</u>
	RED OAKS	
Northern Red Oak (192)		<u>Quercus rubra</u>
Southern Red Oak (7)		<u>Quercus falcata</u>
Scarlet Oak (71)		<u>Quercus coccinea</u>
Black Oak (46)		<u>Quercus velutina</u>
Shingle Oak (3)		<u>Quercus imbricaria</u>
Blackjack Oak (0)		<u>Quercus marilandica</u>
Pin Oak (2)		<u>Quercus palustris</u>
Unidentified Red Oak (0)		<u>Quercus spp.</u>
	HICKORIES	
Bitternut Hickory (0)		<u>Carya cordiformis</u>
Mockernut Hickory (0)		<u>Carya tomentosa</u>
Shagbark Hickory (1)		<u>Carya ovata</u>
Pignut Hickory (0)		<u>Carya glabra</u>
Shellbark Hickory (0)		<u>Carya laciniata</u>
Sweet Pignut Hickory (0)		<u>Carya ovalis</u>
Sand Hickory (0)		<u>Carya pallida</u>
Unidentified Hickory (2)		<u>Carya spp.</u>
	WALNUT	
Black Walnut (0)		<u>Juglans nigra</u>
Butternut (0)		<u>Juglans cinerea</u>
	BEECH	
American Beech (0)		<u>Fagus grandifolia</u>

¹Number in parentheses indicates sample size for the 2007 hard mast survey .

Table 2. Hard mast indices (Greenberg and Warburton, 2007) for Great Smoky Mountains National Park, 1979-2007.

Year	White Oak	Red Oak	Total Oak
1979	4.33 (59) ¹	3.19 (61)	3.91 (120)
1980	0.78 (52)	4.00 (74)	2.87 (126)
1981	3.86 (65)	2.32 (88)	3.11 (153)
1982	0.67 (47)	2.23 (82)	1.79 (129)
1983	.	.	.
1984	.	.	.
1985	2.60 (77)	1.90 (83)	2.34 (160)
1986	1.60 (79)	3.04 (93)	2.53 (172)
1987	2.94 (99)	2.62 (116)	2.91 (215)
1988	2.96 (77)	3.21 (166)	3.33 (243)
1989	0.66 (75)	3.08 (160)	2.49 (235)
1990	1.25 (103)	1.61 (112)	1.53 (215)
1991	1.35 (99)	1.05 (147)	1.24 (246)
1992	0.50 (112)	0.85 (155)	0.76 (267)
1993	0.45 (95)	2.67 (155)	1.98 (250)
1994	0.79 (118)	2.20 (142)	1.68 (260)
1995	1.97 (99)	5.04 (167)	4.16 (266)
1996	3.94 (102)	1.87 (156)	2.81 (258)
1997	0.66 (97)	2.76 (165)	2.14 (262)

Table 2. Continued.

Year	White Oak	Red Oak	Total Oak
1998	1.73 (81)	3.77 (171)	3.33 (252)
1999	1.23 (105)	1.29 (150)	1.35 (255)
2000	0.78 (87)	1.61 (163)	1.42 (250)
2001	1.05 (92)	5.10 (165)	3.92 (257)
2002	0.97 (188)	2.38 (317)	1.99 (503)
2003	0.99 (214)	0.80 (312)	0.94 (526)
2004	2.62 (177)	2.25 (331)	2.52 (508)
2005	0.48 (201)	2.24 (329)	1.70 (530)
2006	0.80 (198)	1.33 (315)	1.21 (513)
2007	2.00 (207)	1.67 (321)	1.91 (528)

¹Number in parentheses indicates sample size for each group of trees.